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09/763,772	02/26/2001	Gustavo Deco	P00,1993	6347

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EXAMINER	
BELL, MELTIN	
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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Applicati n No. 09/763,772	Applicant(s) DECO ET AL.	
	Examin r Meltin Bell	Art Unit 2121	

-- The MAILING DATE of this communication appears on th cover sheet with the correspondence addr ss --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 October 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 September 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☒ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *9/9/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

This action is responsive to application **09/763,772** filed 02/26/2001 (national stage entry of PCT/DE99/01949 International Filing Date: 07/01/1999) as well as the Amendment After Final Specification/Drawings Changes and Information Disclosure Statement (IDS) filed 9/9/04 and Amendment Submitted/Entered with Filing of Request for Continued Examination (RCE) filed 10/27/04. Claims 1-16 filed by the applicant have been entered and examined. An action on the merits of claims 1-16 appears below.

Priority

Acknowledgment is made of applicant's claim for foreign priority based on application number 198 38 654.0 filed in Germany on **8/25/98.**

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the Office presumes that the subject matter of the

various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the Office to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1 and 6-13 are rejected under 35 U.S.C. 103(a) as being obvious over *Buckley* USPN 5,940,529 “Self-organizing circuits” (Filed Nov. 26, 1996) in view of *Gevins* USPN 5,119,816 “EEG spatial placement and enhancement method” (June 2, 1992) and in further view of *Arroyo et al* “A Modular Software Real-Time Brain Wave Detection System” (April 1982).

Regarding claim 1:

Buckley teaches,

- forming discrimination values (column 63, lines 1-23, “OR/NOR Core ... Close core nodes”) dependent on pulses that are formed by the pulsed neurons (column 57, lines 27-37, “The nodes pulsate ... of the axon”) as well as on a training sequence of input quantities (column 78, lines 12-26, “In FIG. 29, MD ... outputs such as 420-422”) that are supplied to the neural network (Fig. 1)

However, *Buckley* doesn’t explicitly teach shortening the second time span to a shortened second time span if the second discrimination value is the same as the first discrimination value while *Gevins* teaches,

- forming discrimination values dependent on pulses as well as on a training sequence of input quantities that are supplied to the neural network (column 4, lines 1-19, "The patient's head ... the desired classification"; column 13, lines 44-47, "Pulse widths of ... the two echos"; column 14, lines 24-55, "More accurate values...or other means")
- training the neural network for a first time span such that a discrimination value is maximized, as a result whereof a first discrimination value is formed (column 3, lines 35-54, "the position of ... or infirm patients"; column 4, lines 1-19, "The patient's head ... EEG recording session"; column 13, lines 44-47, "Pulse widths of ... the two echos")
- after the first discrimination value is formed:
- shortening the first time span to a second time span (column 13, lines 66-68, "The phase and...at the probe")
- forming a second discrimination value for the second time span (column 13, lines 44-47, "Pulse widths of...the two echos")
- forming a second discrimination value for the shortened second time span (column 13, lines 44-47, "Pulse widths of...the two echos")
- iteratively continuing to shorten the second time span and form a second discrimination value for each shortened second time span until the second discrimination value is different from the first discrimination value (column 5, lines 8-29, "For subsequent data...brain and head"; column 15, lines 3-17, "We have also...stop the loop")

- choosing as the trained neural network the neural network of the last iteration wherein the second discrimination value is the same as the first discrimination value (column 15, lines 3-17, "We have also…stop the loop")

Arroyo et al teaches,

- shortening the second time span to a shortened second time span if the second discrimination value is the same as the first discrimination value (page 128, Software Overview section, paragraphs 4-6, "The feature extraction…xenon photo stimulator"; The Implementation section, paragraph 1, "The software system…this data base")

Motivation – The portions of the claimed method would have been a highly desirable feature in this art for improving electroencephalograph (EEG) spatial resolution (*Gevins*, column 1, lines 57-68, "The three-dimensional positions … of a subject"; column 2, lines 1-24, "is measured. A … signals for distortion") and collecting and processing EEG records (*Arroyo et al,* page 126, Abstract, sentence 8, "The system has…classification error rates"). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to modify *Buckley* as taught by *Gevins* and *Arroyo* for the purpose of improving EEG spatial resolution as well as collecting/processing EEG records.

Regarding claim 6:

The rejection of claim 6 is similar to that for claim 1 as recited above since the stated limitations of the claim are set forth in the references. Claim 6's limitations difference is taught in *Gevins*:

- the training sequence of inputs quantities are is of measured physical signals (Abstract, "An improved brain ... head shape class")

Regarding claim 7:

The rejection of claim 7 is the same as that for claim 6 as recited above since the stated limitations of the claim are set forth in the references.

Regarding claim 8:

Buckley teaches,

- forming discrimination values (column 63, lines 1-23, "OR/NOR Core ... Close core nodes") dependent on pulses that are formed by the pulsed neurons (column 57, lines 27-37, "The nodes pulsate ... of the axon") as well as on a training sequence of input quantities (column 78, lines 12-26, "In FIG. 29, MD ... outputs such as 420-422") that are supplied to the neural network (Fig. 1)

However, *Buckley* doesn't explicitly teach shortening the second time span to a shortened second time span if the second discrimination value is the same as the first discrimination value while *Gevins* teaches,

- forming discrimination values dependent on pulses as well as on a training sequence of input quantities that are supplied to the neural network (column 4, lines 1-19, "The patient's head ... the desired classification"; column 13, lines 44-47, "Pulse widths of ... the two echos"; column 14, lines 24-55, "More accurate values...or other means")

- training the neural network for a first time span such that a discrimination value is maximized, as a result whereof a first discrimination value is formed (column 3, lines

35-54, "the position of ... or infirm patients"; column 4, lines 1-19, "The patient's head ... EEG recording session"; column 13, lines 44-47, "Pulse widths of ... the two echos")

- after the first discrimination value is formed:
- shortening the first time span to a second time span (column 13, lines 66-68, "The phase and...at the probe")
- forming a second discrimination value for the second time span (column 13, lines 44-47, "Pulse widths of...the two echos")
- forming a second discrimination value for the shortened second time span (column 13, lines 44-47, "Pulse widths of...the two echos")
- iteratively continuing to shorten the second time span and form a second discrimination value for each shortened second time span until the second discrimination value is different from the first discrimination value (column 5, lines 8-29, "For subsequent data...brain and head"; column 15, lines 3-17, "We have also...stop the loop")
- choosing as the trained neural network the neural network of the last iteration wherein the second discrimination value is the same as the first discrimination value (column 15, lines 3-17, "We have also...stop the loop")
- supplying the sequence of input quantities to the neural network (column 4, lines 5-9, "scaling the vector...the desired classification")
- forming a classification signal that indicates what kind of sequence of input quantities the supplied sequence is (column 2, lines 15-24, "the EEG spatial...signals for

distortion"; column 3, lines 62-68, "electrode positions are…that particular canonical"; column 4, lines 1-15, "head. The patient's…of that head")

Arroyo et al teaches,

- shortening the second time span to a shortened second time span if the second discrimination value is the same as the first discrimination value (page 128, Software Overview section, paragraphs 4-6, "The feature extraction…xenon photo stimulator"; The Implementation section, paragraph 1, "The software system…this data base")

Motivation – The portions of the claimed method would have been a highly desirable feature in this art for improving electroencephalograph (EEG) spatial resolution (*Gevins*, column 1, lines 57-68, "The three-dimensional positions … of a subject"; column 2, lines 1-24, "is measured. A … signals for distortion") and collecting and processing EEG records (*Arroyo et al,* page 126, Abstract, sentence 8, "The system has…classification error rates"). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to modify *Buckley* as taught by *Gevins* and *Arroyo* for the purpose of improving EEG spatial resolution as well as collecting/processing EEG records.

Regarding claim 9:

The rejection of claim 9 is similar to that for claim 8 as recited above since the stated limitations of the claim are set forth in the references. Claim 9's limitations difference is taught in *Gevins*:

- the training sequence of input quantities and the sequence of input quantities are measured physical signals (Abstract, "An improved brain … head shape class")

Regarding claims 10:

The rejection of claim 10 is the same as that for claim 9 as recited above since the stated limitations of the claim are set forth in the references.

Regarding claim 11:

Buckley teaches,

- discrimination values are formed (column 63, lines 1-23, "OR/NOR Core ... Close core nodes") dependent on pulses that are formed by the pulsed neurons (column 57, lines 27-37, "The nodes pulsate ... of the axon") as well as on a training sequence of input quantities (column 78, lines 12-26, "In FIG. 29, MD ... outputs such as 420-422") that are supplied to the neural network (Fig. 1)

However, *Buckley* doesn't explicitly teach shortening the second time span to a shortened second time span if the second discrimination value is the same as the first discrimination value while *Gevins* teaches,

- forming discrimination values dependent on pulses as well as on a training sequence of input quantities that are supplied to the neural network (column 4, lines 1-19, "The patient's head ... the desired classification"; column 13, lines 44-47, "Pulse widths of ... the two echos"; column 14, lines 24-55, "More accurate values... or other means")
- the neural network is trained such that for a first time span a discrimination value is maximized, as a result whereof a first discrimination value is formed (column 3, lines 35-54, "the position of ... or infirm patients"; column 4, lines 1-19, "The patient's head ... EEG recording session"; column 13, lines 44-47, "Pulse widths of ... the two echos")
- after the first discrimination value is formed:

- the first time span is shortened to a second time span (column 13, lines 66-68, "The phase and...at the probe")

- a second discrimination value is formed for the second time span (column 13, lines 44-47, "Pulse widths of...the two echos")

- the second time span is shortened to a shortened second time span (column 13, lines 44-47, "Pulse widths of...the two echos")

- a second discrimination value is formed for the shortened second time span (column 13, lines 44-47, "Pulse widths of...the two echos")

- the second time span is shortened and a second discrimination value is formed for each shortened second time span, iteratively, until the second discrimination value is different from the first discrimination value (column 5, lines 8-29, "For subsequent data...brain and head"; column 15, lines 3-17, "We have also...stop the loop")

- the trained neural network is chosen to be the neural network of the last iteration when the second discrimination value was the same as the first discrimination value (column 15, lines 3-17, "We have also...stop the loop")

Arroyo et al teaches,

- shortening the second time span to a shortened second time span if the second discrimination value is the same as the first discrimination value (page 128, <u>Software Overview</u> section, paragraphs 4-6, "The feature extraction...xenon photo stimulator"; <u>The Implementation</u> section, paragraph 1, "The software system...this data base")

<u>Motivation</u> – The portions of the claimed method would have been a highly desirable feature in this art for improving electroencephalograph (EEG) spatial resolution (*Gevins*,

column 1, lines 57-68, "The three-dimensional positions ... of a subject"; column 2, lines 1-24, "is measured. A ... signals for distortion") and collecting and processing EEG records (*Arroyo et al,* page 126, Abstract, sentence 8, "The system has...classification error rates"). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to modify *Buckley* as taught by *Gevins* and *Arroyo* for the purpose of improving EEG spatial resolution as well as collecting/processing EEG records.

Regarding claim 12:

The rejection of claim 12 is the same as that for claim 11 as recited above since the stated limitations of the claim are set forth in the references.

Regarding claim 13:

The rejection of claim 13 is the same as that for claim 11 as recited above since the stated limitations of the claim are set forth in the references.

Claims 2-3 are rejected under 35 U.S.C. 103(a) as being obvious over *Buckley* in view of *Gevins* in view of *Cooley et al* in view of *Arroyo et al* and further in view of *Peng et al* "Generalization and Comparison of Alopex Learning Algorithm and Random Optimization Method for Neural Networks" (May 1998).

Regarding claim 2:

Buckley teaches,

- forming discrimination values (column 63, lines 1-23, "OR/NOR Core ... Close core nodes") dependent on pulses that are formed by the pulsed neurons (column 57, lines

27-37, "The nodes pulsate ... of the axon") as well as on a training sequence of input quantities (column 78, lines 12-26, "In FIG. 29, MD ... outputs such as 420-422") that are supplied to the neural network (Fig. 1)

However, *Buckley* doesn't explicitly teach shortening the second time span to a shortened second time span if the second discrimination value is the same as the first discrimination value while *Gevins* teaches,

- forming discrimination values dependent on pulses as well as on a training sequence of input quantities that are supplied to the neural network (column 4, lines 1-19, "The patient's head ... the desired classification"; column 13, lines 44-47, "Pulse widths of ... the two echos"; column 14, lines 24-55, "More accurate values...or other means")
- training the neural network for a first time span such that a discrimination value is maximized, as a result whereof a first discrimination value is formed (column 3, lines 35-54, "the position of ... or infirm patients"; column 4, lines 1-19, "The patient's head ... EEG recording session"; column 13, lines 44-47, "Pulse widths of ... the two echos")
- after the first discrimination value is formed:
- shortening the first time span to a second time span (column 13, lines 66-68, "The phase and...at the probe")
- forming a second discrimination value for the second time span (column 13, lines 44-47, "Pulse widths of...the two echos")
- forming a second discrimination value for the shortened second time span (column 13, lines 44-47, "Pulse widths of...the two echos")

- iteratively continuing to shorten the second time span and form a second discrimination value for each shortened second time span until the second discrimination value is different from the first discrimination value (column 5, lines 8-29, "For subsequent data...brain and head"; column 15, lines 3-17, "We have also...stop the loop")

- choosing as the trained neural network the neural network of the last iteration wherein the second discrimination value is the same as the first discrimination value (column 15, lines 3-17, "We have also...stop the loop")

Arroyo et al teaches,

- shortening the second time span to a shortened second time span if the second discrimination value is the same as the first discrimination value (page 128, <u>Software Overview</u> section, paragraphs 4-6, "The feature extraction...xenon photo stimulator"; <u>The Implementation</u> section, paragraph 1, "The software system...this data base")

Peng et al teaches,

- an optimization method that is not gradient based is utilized for the maximization of at least one of the first discrimination value and of the second discrimination value (page 1147, Abstract, sentences 3-4, "The Alopex algorithm...error norm measure")

<u>Motivation</u> – The portions of the claimed method would have been a highly desirable feature in this art for improving electroencephalograph (EEG) spatial resolution (*Gevins*, column 1, lines 57-68, "The three-dimensional positions ... of a subject"; column 2, lines 1-24, "is measured. A ... signals for distortion"), collecting and processing EEG records (*Arroyo et al,* page 126, Abstract, sentence 8, "The system has...classification error

rates") and converging faster (*Peng et al*, page 1148, section V, paragraph 2, "Simulation results show... speed and range"). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to modify *Buckley* as taught by *Gevins, Arroyo* and *Peng et al* for the purpose of improving EEG spatial resolution as well as collecting/processing EEG records and converging faster.

Regarding claim 3:

The rejection of claim 3 is the same as that for claim 2 as recited above since the stated limitations of the claim are set forth in the references.

Claims 4-5 are rejected under 35 U.S.C. 103(a) as being obvious over *Buckley* in view of *Gevins* in view of *Cooley et al* in view of *Arroyo et al* and further in view of *Deco et al* "Information Transmission and Temporal Code in Central Spiking Neurons" (December 8, 1997).

Regarding claims 4:

Buckley teaches,

- forming discrimination values (column 63, lines 1-23, "OR/NOR Core ... Close core nodes") dependent on pulses that are formed by the pulsed neurons (column 57, lines 27-37, "The nodes pulsate ... of the axon") as well as on a training sequence of input quantities (column 78, lines 12-26, "In FIG. 29, MD ... outputs such as 420-422") that are supplied to the neural network (Fig. 1)

However, *Buckley* doesn't explicitly teach shortening the second time span to a shortened second time span if the second discrimination value is the same as the first discrimination value or the first discrimination value I(T) satisfies the following rule:

$$I(T) = I\left(s; \left\{ \begin{array}{c} t_1^{(1)},\ldots,t_m^{(1)},\ldots,t_{k1}^{(1)},t_1^{(2)},\ldots,t_m^{(2)},\ldots,t_{k2}^{(2)},\ldots, \\ \\ t_1^{(n)},\ldots,t_m^{(n)},\ldots,t_{kn}^{(n)},\ldots,t_1^{(N)},\ldots,t_m^{(N)},\ldots,t_{kN}^{(N)} \end{array} \right\}\right),$$

wherein

- s references input quantities,
- $t_m^{(n)}$ references a pulse that is generated by a pulsed neuron n at a time m within a time span [0, T],
- k_n (n=1,…,N) references a point in time at which the pulsed neuron n has generated the last pulse within the time span [0,T], and
- N references a plurality of pulsed neurons contained in the neural network

while *Gevins* teaches,

- forming discrimination values dependent on pulses as well as on a training sequence of input quantities that are supplied to the neural network (column 4, lines 1-19, "The patient's head … the desired classification"; column 13, lines 44-47, "Pulse widths of … the two echos"; column 14, lines 24-55, "More accurate values…or other means")

- training the neural network for a first time span such that a discrimination value is maximized, as a result whereof a first discrimination value is formed (column 3, lines 35-54, "the position of … or infirm patients"; column 4, lines 1-19, "The patient's head … EEG recording session"; column 13, lines 44-47, "Pulse widths of … the two echos")

- after the first discrimination value is formed:

- shortening the first time span to a second time span (column 13, lines 66-68, "The phase and...at the probe")
- forming a second discrimination value for the second time span (column 13, lines 44-47, "Pulse widths of...the two echos")
- forming a second discrimination value for the shortened second time span (column 13, lines 44-47, "Pulse widths of...the two echos")
- iteratively continuing to shorten the second time span and form a second discrimination value for each shortened second time span until the second discrimination value is different from the first discrimination value (column 5, lines 8-29, "For subsequent data...brain and head"; column 15, lines 3-17, "We have also...stop the loop")
- choosing as the trained neural network the neural network of the last iteration wherein the second discrimination value is the same as the first discrimination value (column 15, lines 3-17, "We have also...stop the loop")

Arroyo et al teaches,

- shortening the second time span to a shortened second time span if the second discrimination value is the same as the first discrimination value (page 128; Software Overview section, paragraphs 4-6, "The feature extraction...xenon photo stimulator"; The Implementation section, paragraph 1, "The software system...this data base")

Deco et al teaches,

- the first discrimination value I(T) satisfies the following rule:

$$t_1^{(1)},\ldots,t_m^{(1)},\ldots,t_{k1}^{(1)},t_1^{(2)},\ldots,t_m^{(2)},\ldots,t_{k2}^{(2)},\ldots,$$

$$I(T) = I\left(s; \{t_1^{(n)},\ldots,t_m^{(n)},\ldots,t_{kn}^{(n)},\ldots,t_1^{(N)},\ldots,t_m^{(N)},\ldots,t_{kN}^{(N)}\}\right),$$

wherein

- s references input quantities,
- $t_m^{(n)}$ references a pulse that is generated by a pulsed neuron n at a time m within a time span [0, T],
- k_n (n=1,…,N) references a point in time at which the pulsed neuron n has generated the last pulse within the time span [0,T], and
- N references a plurality of pulsed neurons contained in the neural network

(page 4697, paragraph 2, "We first consider… = $R \cdot I(\{t_0,\ldots,t_i,\ldots\};T)$. (2)").

- decision time as related to discriminability (page 4699, paragraph 2, "Let us analyze…is most efficient")

Motivation – The portions of the claimed method would have been a highly desirable feature in this art for improving electroencephalograph (EEG) spatial resolution (*Gevins*, column 1, lines 57-68, "The three-dimensional positions … of a subject"; column 2, lines 1-24, "is measured. A … signals for distortion"), collecting and processing EEG records (*Arroyo et al*, page 126, Abstract, sentence 8, "The system has…classification error rates") and efficiently discriminating input signals (*Deco et al*, page 4700, paragraph 2, "In conclusion, the…transmission of information"). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to modify *Buckley* as taught by *Gevins, Arroyo* and *Deco et al* for the purpose of improving EEG spatial resolution as well as collecting/processing EEG records and efficiently discriminating input signals.

Regarding claim 5:

The rejection of claim 5 is similar to that for claim 4 as recited above since the stated limitations of the claim are set forth in the references. Claim 5's limitations difference is taught in *Deco et al*:

- the first discrimination value I(T) satisfies the following rule:

$$I(T) = -\int p(out)\cdot \ln(p(out))dt_1^{(1)}\ldots dtk_1^{(1)}\ldots dt_{kN}^{(N)} + \\ + \sum_{j=1}^{s} p_j \int p(out|s^{(j)})\cdot \ln(p(out|s^{(j)}))dt_1^{(1)}\ldots dtk_1^{(1)}\ldots dt_{kN}^{(N)}$$

with

$$p(out) = \sum_{j=1}^{s} p_j p(out|s^{(j)}),$$

wherein

- $s^{(j)}$ references an input quantity that is applied to the neural network at a time j,
- p_j references a probability that the input quantity $s^{(j)}$ is applied to the neural network at a pint in time j,
- $p(out|s^{(j)})$ references a conditioned probability that a pulse is generated by a pulsed neuron in the neural network under the condition that the input quantity $s^{(j)}$ is applied to the neural network at a point in time j

(page 4697, paragraph 3, "In the second…in the interval [*t'*, *t'* + *T*]"; page 4698, paragraph 1, "where *t'* is…same rate *R*")

Claims 14-16 are rejected under 35 U.S.C. 103(a) as being obvious over *Gevins* in view of *Arroyo et al.*

Regarding claim 14:

Gevins teaches,

- a processor that is configured such that the following steps implemented (column 2, lines 6-10, "The head measurement ... of head shapes")

- the neural network is trained such that for a first time span a discrimination value is maximized, as a result whereof a first discrimination value is formed (column 3, lines 35-54, "the position of ... or infirm patients"; column 4, lines 1-19, "The patient's head ... EEG recording session"; column 13, lines 44-47, "Pulse widths of ... the two echos")

- after the first discrimination value is formed:

- the first time span is shortened to a second time span (column 13, lines 66-68, "The phase and...at the probe")

- a second discrimination value is formed for the second time span (column 13, lines 44-47, "Pulse widths of...the two echos")

- the second time span is shortened to a shortened second time span (column 13, lines 44-47, "Pulse widths of...the two echos")

- a second discrimination value is formed for the shortened second time span (column 13, lines 44-47, "Pulse widths of...the two echos")

- the second time span is shortened and a second discrimination value is formed for each shortened second time span, iteratively, until the second discrimination value is different from the first discrimination value (column 5, lines 8-29, "For subsequent data...brain and head"; column 15, lines 3-17, "We have also...stop the loop")

- the trained neural network is chosen to be the neural network of the last iteration when the second discrimination value was the same as the first discrimination value (column 15, lines 3-17, "We have also...stop the loop")

However, *Gevins* doesn't explicitly teach shortening the second time span to a shortened second time span if the second discrimination value is the same as the first discrimination value while *Arroyo et al* teaches,

- shortening the second time span to a shortened second time span if the second discrimination value is the same as the first discrimination value (page 128, Software Overview section, paragraphs 4-6, "The feature extraction...xenon photo stimulator"; The Implementation section, paragraph 1, "The software system...this data base")

Motivation – The portions of the claimed method would have been a highly desirable feature in this art for improving electroencephalograph (EEG) spatial resolution (*Gevins*, column 1, lines 57-68, "The three-dimensional positions ... of a subject"; column 2, lines 1-24, "is measured. A ... signals for distortion") and collecting and processing EEG records (*Arroyo et al,* page 126, Abstract, sentence 8, "The system has...classification error rates"). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to modify *Buckley* as taught by *Gevins* and *Arroyo* for the purpose of improving EEG spatial resolution as well as collecting/processing EEG records.

Regarding claim 15:

The rejection of claim 15 is the same as that for claim 14 as recited above since the stated limitations of the claim are set forth in the references.

Regarding claim 16:

The rejection of claim 16 is the same as that for claim 14 as recited above since the stated limitations of the claim are set forth in the references.

RESPONSE TO APPLICANTS' AMENDMENT REMARKS

IDS, Specification/Drawings, Claim Objections

Applicant requests the examiner initial, sign and return the 9/9/04 PTO-1449 indicating consideration of the Gerstner reference (9/9/04 Amendment REMARKS page 10, paragraph 2). The examiner appreciates the legible copy of the reference. As requested, the initialed and signed PTO-1449 is being sent with this action.

Applicant argues that Fig. 4 and the specification page 226 have been revised to clarify the translation of the original German language application (9/9/04 Amendment REMARKS page 10, paragraph 3):element 402 has been changed to --'WHICH INPUT SIGNAL?--. Applicant's arguments have been fully considered and are persuasive. The objections to the specification and drawings are withdrawn.

Claims 6 and 11 are objected to because of minor informalities: 'inputs quantities are is of' would read well as 'input quantities are' in claim 6 and 'steps implemented' would read well as 'steps are implemented' in claim 11. Appropriate correction is required.

Claim Rejections - 35 USC § 103

Applicant argues that the features of the claimed invention are not disclosed in or suggested by *Gevins* (10/27/04 Amendment REMARKS page 7, paragraph 3), *Gevins* is not concerned with the signal produced by the EEG (10/27/04 Amendment REMARKS page 7, paragraph 4), the individual claimed method steps for training the neural network are not mentioned in *Gevins* (10/27/04 Amendment REMARKS page 7, paragraph 5) and that *Gevins* does not relate to training a neural network, pulsing and pulsed neurons (9/9/04 Amendment REMARKS page 9, paragraphs 3-4). Applicant also argues that the invention of the subject application could be used for and/or with an EEG signal (10/27/04 Amendment REMARKS page 7, paragraph 3-4) and that the present invention may be used to classify a time series of input values (10/27/04 Amendment REMARKS page 7, paragraph 5). The examiner notes that subject matter in the applicant's arguments is not in the claims and directs the applicant to the above 35 USC 103 rejection of claims in light of *Buckley*, *Gevins, Arroyo et al, Peng et al* and *Deco et al*. Further, the purposes and motivations for modifying *Buckley* by and in combination with other references include improving EEG spatial resolution (*Gevins*, column 1, lines 57-68, "The three-dimensional positions ... of a subject"; column 2, lines 1-24, "is measured. A ... signals for distortion"), collecting and processing EEG records (*Arroyo et al,* page 126, Abstract, sentence 8, "The system has...classification error rates"), converging faster (*Peng et al*, page 1148, section V, paragraph 2, "Simulation results show...speed and range") and efficiently discriminating input signals (*Deco et al*, page 4700, paragraph 2, "In conclusion, the...transmission of information").

As set forth with regards to *Buckley*, *Gevins, Arroyo et al, Peng et al* and *Deco et al*, the items listed explicitly and inherently teach each element of the applicants' claimed limitations. Applicants have not set forth any distinction or offered any dispute between the claims of the subject application, *Buckley*'s Self-organizing circuits, *Gevins'* EEG spatial placement and enhancement method, *Arroyo et al*'s A Modular Software Real-Time Brain Wave Detection System, *Peng et al*'s "Generalization and Comparison of Alopex Learning Algorithm and Random Optimization Method for Neural Networks" and *Deco et al*'s Information Transmission and Temporal Code in Central Spiking Neurons.

Conclusion

The prior art made of record is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the Office should be directed to Meltin Bell whose telephone number is 571-272-3680. This Examiner can normally be reached on Mon - Fri 7:30 am - 4:00 pm.

If attempts to reach this Examiner by telephone are unsuccessful, his supervisor, Anthony Knight, can be reached on 571-272-3687. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571-272-2100.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MB/ MB 1.18
January 18, 2005

Anthony Knight
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Group 3600